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ARCADIS GERAGHTY & MILLER



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Subject:
Draft Final Design Report - Landfill Cover System
Woodlawn Landfill Site
Cecil County, Maryland Remedial Design/Remedial Action,
Administrative Order, USEPA Docket No. III 95-05-DC,

ENVIRONMENTAL

Dear Ms. Rossi:

Enclosed for your review, please find two copies of the response to USEPA's May 27, 1998 *Comments on Final Design Report* for the above referenced report. Two copies of Addendum 2 are also enclosed and include replacement pages for the report. ARCADIS Geraghty & Miller has prepared this document on behalf of Bridgestone/Firestone, Inc. in accordance with the remedial design requirements set forth in the above order.

Langhorne
06 April 1998

Contact:
Tina Stack,
Project Scientist

Extension:
(215) 752-6840

The draft Final Design Report evaluates two potential technologies for landfill capping and, for a variety of reasons, recommends the installation of an engineered phyto-cover system instead of the single-barrier cover system selected by the ROD. The phyto-cover is a natural complement and integral component of the natural attenuation system that has been proven to be effective in mitigating potential impacts to groundwater while protecting human health and the environment. As such, the engineered phyto-cover alternative is far better suited than the single barrier cover which has the potential to interfere with the beneficial natural attenuation mechanisms and is unnecessary to ensure protection of human health and the environment.

The Woodlawn site is an appropriate site to gain the experience with this innovative technology because the site is well monitored and the potential for public exposure to site constituents is essentially nil. It represents a significant opportunity to document the benefits of this innovative cover technology over traditional covers.

A simple vegetative cover, consisting of two feet of soil and optimized grass vegetation, would also be an appropriate cover remedy for the Woodlawn landfill, as we have recently discussed. We will soon be forwarding a schedule for the accelerated design and construction of a vegetative cover.

AR312173

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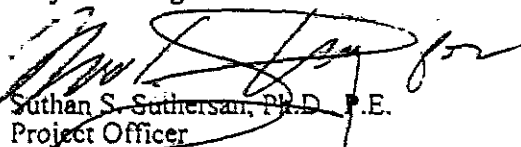
We look forward to discussing the progress of the phyto-cover design, performance monitoring and vegetative cap design at our June 24, 1998, meeting with you. In the meantime, if you have any questions regarding this design report, please contact the undersigned.

Sincerely,

ARCADIS Geraghty & Miller Inc.



Tina Stack
Project Manager


Suthan S. Suthersan, P.R.D., P.E.
Project Officer

Copies:

Ms. Mimi Boxwell, U.S. Army Corps of Engineers (5 copies)
Mr. James Gravette, MDE (2 copies)
Mr. Timothy A. Bent, CPG, Bridgestone/Firestone, Inc. (1 copy)
Kevin A. Gaynor, Esq., Vinson & Elkins (1 copy)
Mr. Joseph Lewandowski, ERM (1 copy)

This document was prepared for the sole use of Bridgestone/Firestone, and the regulatory agencies involved with this project. No other parties should rely on the information contained herein without prior written consent of ARCADIS Geraghty & Miller.

AR312174

ADDENDUM NO. 2
RESPONSE TO FINAL DESIGN REPORT
WOODLAWN LANDFILL SITE
CECIL COUNTY, MARYLAND

This Addendum No. 2 to the Response to the Final Design Report for the Woodlawn Landfill Site is issued for incorporation into Final Design Report Package. The revisions noted in this addendum are provided for the purposes of clarification of the requirements of the Final Design Report.

The Response to the Final Design Report shall be modified as follows:

Pages 3-31 through 3-45: Replace Pages 3-31 through 3-45 with the attached, modified Pages 3-31 through 3-45

Table 3-5: Replace Table 3-5 with the attached, modified Table 3-5.

Figure 3-14: Replace Figure 3-14 with the attached, modified Figure 3-14.

Appendix C: Insert attached Summary of Stormwater Run-off for Single Barrier Cover System at the beginning of Appendix C-3.

Appendix D: Replace Appendices D-1 and D-2 in their entirety.

Appendix E:

- a) Replace Pages 01351-27 and 01351-28 with the attached, modified Pages 01351-27 and 01351-28.
- b) Replace Specification 02112 in its entirety.
- c) Replace Pages 02200-3 through 02200-18 with the attached, modified Pages 02200-3 through 02200-18.
- d) Replace Pages 02232-3 through 02232-6 with the attached, modified Pages 02232-3 through 02232-6.
- e) Replace Pages 02713-3 through 02713-6 with the attached, modified Pages 02713-3 through 02713-6.

Appendix H:

- a) Insert Tables H-1 through H-6 and Figures H-1 through H-3.
- b) Replace Appendix D in its entirety.

Appendix I: Replace Pages 4-3 and 4-4 with the attached, modified Pages 4-3 and 4-4.

FINAL DESIGN REPORT
WOODLAWN LANDFILL SITE
CECIL COUNTY, MARYLAND

REVISION NO. 02
JUNE 17, 1998

Appendix J:

- a) Replace Appendix J Table of Contents with the attached, modified Table of Contents.
- b) Insert Supplemental Landfill Gas Calculations at the end of Appendix J6.
- c) Insert Appendix J7 at the end of Appendix J.

Appendix K:

Insert Figure K-1 at the end of Appendix K.

Design Drawings:

Replace Drawings B-3, D-1 and D-2 in their entirety.

FINAL DESIGN REPORT
WOODLAWN LANDFILL SITE
CECIL COUNTY, MARYLAND

REVISION NO. 02
JUNE 17, 1998

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
COMMENTS ON FINAL DESIGN REPORT
WOODLAWN LANDFILL SITE

EPA Comments

1. Page 3-38: Two sets of units are given for gas pressure. Please include only the correct units. Appendix J-6 gives the estimated generation rate for nonmethane organic compounds, as well as the estimated volume and mass of waste in the landfill. Supporting calculations for the design of the landfill gas collection system are not provided. Please provide the supporting calculations.

In addition, header pipe system will not be connected to form a continuous loop (Drawing B5). Please revise the text on page 3-38.

Response: The text has been changed on page 3-38 to include only the correct units for gas pressure (psf). In addition, four pages have been added to Appendix J-6 that contain the supporting calculations for the design of the landfill gas collection system. Since the header pipe system will not be connected to form a continuous loop, the text on page 3-38 has been revised accordingly.

2. Page 3-45: The Final Design Report states that a preliminary construction schedule is presented in Figure 3-12. ARCADIS Geraghty & Miller's response to EPA's comment number 7 states that a "draft generic schedule" is provided in the Final Design Report. A preliminary construction schedule could not be found. The Order requires that the Final Design Report include a site-specific Remedial Action construction schedule, not a generic schedule. Please submit.

Response: A preliminary construction schedule has been added as Figure 3-14. The text on page 3-45 has been revised to reflect the new figure number.

3. Table 3-5: Please verify that construction and operation and maintenance (including sampling) costs for perimeter gas probes are included in the cost estimate. In addition, the subbase layer is to be 24 inches thick and the average thickness of the existing cover soil is 12 inches. Will 6 inches of common borrow be adequate to complete the subbase layer? Finally, please verify the unit cost for the flexible membrane liner (FML) (40-mil thick LLDPE) and revise the total cost estimate as necessary. The unit cost given in the table for FML appears to be low.

Response: The construction and annual maintenance/sampling costs for the perimeter gas monitoring probes have been added to Table 3-5. The costs have also been adjusted to include twelve inches of common borrow for the subbase layer, as that layer is to be 24 inches thick and there are, on average, twelve inches of existing cover. The unit cost for the FML was obtained from a reliable vendor and is reasonable.

4. Appendix C-3: Please provide a summary sheet (including objective, method, input and results) for the single-barrier cover stormwater runoff estimate.

Response: A summary sheet has been added for Appendix C-3.

5. Appendix D-1: Items number 17 in the Closure Period Inspection Form and number 16 in the Post-closure Period Inspection Form should be rephrased. It does not seem appropriate to request an explanation when no "trees and plants" are observed to be growing in the cap. The cap vegetation is to consist of selected grasses, not trees and other plants. Additionally, the forms do not address inspection of gas vents, monitoring wells and perimeter gas monitoring probes. Please revise and resubmit.

Response: The statements regarding "trees and plants" in the inspection forms have been reworded. The form now asks if "vegetation is intact" everywhere across the cap. An explanation is required when vegetation is not intact, as such areas are subject to increased exposure to erosion and may indicate cap damage. Additional sections have been added to the inspection forms to address the inspection of gas vents, gas monitoring probes, and monitoring wells.

APPENDIX E

6. Page 01351-27: Paragraph 1.17.H states, The "HSP shall describe Contractor procedures to maintain traffic safety for the project in accordance with 29 CFR 1910, Occupational Safety and Health Standards; and 29 CFR 1926, Safety and Health Regulation for Construction." Neither of these regulations concern safety practices for traffic on public roadways (e.g., 29 CFR 1926 regulations for motor vehicles pertain exclusively to off-highway traffic). The Health and Safety Plan for Remedial Action should also include procedures to minimize traffic related hazards on public roads.

Response: Paragraph 1.17.H has been revised accordingly to reference applicable Maryland traffic safety requirements.

7. Page 01351-28, paragraph 1.17.I: The title (Hazardous Materials Table, Special Provisions,...) of 49 CFR 172 should appear directly after the citation. In addition, hazard communication standards are found in 29 CFR 1910.1200 (Hazard Communication). 29 CFR 1910.1200 should be cited in the paragraph instead of 29 CFR 1910.120. The specifications need not cite 29 CFR 1926.59. The requirements of that section are identical to those of 29 CFR 1910.1200.

Response: Paragraph 1.17.I has been revised accordingly.

8. Page 02110-3, paragraph 3.03.C: Soils which are found not to be suitable for use in the foundation layer may not be used in the "protective cover layer" or the "vegetative soil" unless the soil has been evaluated to ensure that the material is free of unacceptable levels of contaminants. Such evaluation would include full scan target compound list/target analyte list analyses of soils and comparison of analytical results with criteria determined by EPA and the State to be acceptable for the site. Please include the testing requirement and proposed acceptance criteria in the appropriate section of the specifications and specify disposal procedures for soils which may not be used in the foundation layer in section 3.03 (Disposal of Materials) of the specification.

Response: (Please refer also to Comment #3 from the MDE.) Based upon preliminary soils balance information, it has been determined that the intermediate cover currently in place will not be required for use as protective cover.

This paragraph says "Stripped soils that do not meet the criteria set forth in Section 02200, except for the criteria set forth in Section 1.07, and shall not be used in the foundation layer, unless otherwise directed by the ENGINEER. Soils that do not meet the criteria of Section 02200 shall not be incorporated into the foundation layer. These materials shall be disposed by CONTRACTOR in accordance with the State and county requirements and regulations. No soil shall be utilized without approval of the ENGINEER."

Section 02110 is specific to site clearing and not to earthwork, which is described by Section 02200. As there will be no on-site borrow source for materials, the contractor will be required to provide a certification that the material provided is clean and acceptable for use as clean fill.

9. Page 02200-3, item D: The test method for permeability of granular soils (constant head) is ASTM D-2434.

Response: The referenced test method for permeability of granular soils has been revised to "ASTM D-2434".

10. Page 02200-4, paragraph 1.06.D. The cap will not include a gas collection layer. Please revise.

Response: Paragraph 1.06 D has been revised accordingly.

11. Page 02200-4, paragraph 1.06.E. The response to EPA's March 11, 1998 comment 31 is not adequate. Please review EPA's March 11, 1998 comment and see comment 8, above. EPA and the State will not "approve" the proposed borrow source but will review certifications and analytical data that demonstrates compliance with the approved specification prior to placement of borrow material. Please include test procedures and acceptance criteria for uncontaminated soils in the specification and the Construction Quality Assurance Plan (CQAP) (Appendix I).

Response: Paragraph 1.06.E. has been revised accordingly, and the test procedures and acceptance criteria for uncontaminated soils have been included in the specification and the Construction Quality Assurance Plan.

12. Page 02200-6, section 2.01: Trenches for the gas collection pipes will be excavated into the waste and will not be within the foundation layer. Please correct.

Response: The referenced sentence has been revised accordingly.

13. Page 02713-5, paragraph 1.07.B.4: The specifications require the Contractor to establish testing parameters for the interface friction (direct shear) testing. We disagree with this approach. The designer should establish all testing parameters for the interface friction testing and include these requirements in the specifications. Interface friction testing should be performed for all critical interface surfaces, such as soil/geomembrane, geomembrane/geocomposite, and geocomposite/cover soil, and the specifications should establish the minimum required friction strength (angle) for each critical interface.

Response: Supplemental slope stability calculations were conducted to determine the acceptable shear strength values for the cover system. Acceptable shear strength values are defined as the combination of friction and cohesion values which meet or exceed a factor of safety of 1.5. Regardless of the cover system

14. Specification 02936: Seed mixes proposed in Table 02936-2 contain high maintenance species and may not be optimal for the landfill cover. The county soil conservation district must be consulted regarding perennial cover species as required by COMAR 26.04.07.21.E(4). Please revise the proposed seeding requirements following consultation with the county soil conservation district. Of the permanent seed mixes listed in Table 02936-2, mix #3 (with the addition of birdsfoot trefoil and replacement of tall fescue with lower maintenance hard fescue) may be the preferred mix if the soil has already been stabilized with a temporary vegetative cover. Otherwise, the following mix would be suitable for the landfill cover application unless otherwise recommended by the county soil conservation district: 4.5lbs./1000 sq.ft. hard fescue ("Reliant" or improved); 10 lbs./acre birdsfoot trefoil (inoculant must be used); and 5 lbs./1000 sq.ft. annual rye. Percent pure live seed (PLS) should be 83 percent for all of the above.

15. Pages 02936-3 to-4, paragraph 2.01:

- Response:** The soil conditions presented in Paragraph 2.01 D comply with the minimum soil conditions defined for permanent vegetative establishment in the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, prepared by the Maryland Department of Environment Water Management Administration in association with Soil Conservation Service and State Soil Conservation Committee.

16. Drawing B3: This drawing indicates that vadose zone gas monitoring well VGM-4 would be located approximately 200 feet outside the northern property boundary. ARCADIS Geraghty & Miller states that the proposed location for well VGM-4 is beyond the property boundary because of access limitations. Further explanation is not provided. Unless adequate justification can be provided, well VGM-4 should be sited at the property boundary, consistent with State regulations (see MDE comment number 2).

Response: Vadose zone gas monitoring well VGM-4 has been relocated approximately 200 feet due south, just south of the northern property boundary. Drawing B3 has been revised accordingly.

Appendix H, Field Sampling and Analysis Plan (FSAP):

17. The FSAP is presently missing several important tables: (1) number of samples to be collected and analyses to be performed, per matrix; and (2) sample containers, preservatives and holding times for the various analyses. Please include them.

This information has been provided in Appendix H in Tables H-1, H-2 and H-3.

18. Page 3-1, first paragraph: Please see EPA's May 27, 1998 comments of the February 1998 Landfill Cover System Habitat Impact Analysis and Environmental Restoration Plan (HIA/ERP) regarding the frequency of stream monitoring required by the Record of Decision.

Stream Monitoring Schedule

Bridgestone Firestone has revised the stream water, sediment and benthic macroinvertebrate monitoring schedule to include:

- One full round of monitoring samples at the mid-point of cover construction.
- Two full rounds of monitoring samples in the first year after construction. The first round of post-construction sampling will include one spring and one fall sampling round coordinated with the benthic macroinvertebrate sampling.
- One full round of monitoring samples annually for the life of the cover, or as modified by regular evaluation of the monitoring program. Annual sampling will be alternated between spring and fall to accommodate seasonal benthic macroinvertebrate monitoring.

The appropriate sections of Appendix H have been revised to the new monitoring schedule.

19. Pages 3-2 to 3-3, Section 3.1.1: Please see EPA's May 27, 1998 comment 11 on the HIA/ERP.

(EPA Comment 11: Page 4-8. Section 4.5.1: This section is vague as to how and where visual inspections of vegetation and wildlife species composition will be performed. What phyla will be monitored? Which sampling methods will be employed? The "watch" sites should consist of transects through the habitat parcels along which observations are made and vegetation and wildlife sampling are performed. Please provide additional detail as indicated. In addition, the definition of a "consequential change" should not be limited to alterations "caused by the landfill and creating or likely to create problems which require a response action." Any observed destruction or degradation of habitat should be considered a "consequential change."

Sections 3.1.1 and 3.1.1.1 have been revised to identify the visual inspection cap perimeter path, adjacent habitat transects, and Watch site locations along those transects. Figure H-1 has been added to show the transects and the watch locations along the transects. This Section has also been revised to include a description of the baseline parameters and visual inspection parameters to be monitored on the inspection routes and at the Watch Locations.

The appropriate sections of Appendix H have been revised to define Consequential Change as any observed destruction or degradation of habitat. If the initial actions by the Contingency Response Team determine that the Consequential Change is not related to the landfill and is not impacting or likely to impact the cover system performance, Bridgestone Firestone's response will be limited to notifying EPA of the situation and sharing any relevant data.

20. Pages 3-4 to 3-5, Sections 3.1.2.1 and 3.1.2.2 and page 3-7, last paragraph: Please see EPA's May 27, 1998 comments on the HIA/ERP numbered 12, 13 and 16.

In response to these comments, Appendix H has been revised in response the referenced May 27 comments. These revisions include:

- Inclusion of a figure showing the stream and habitat monitoring locations (Drawing Nos. H-1 and H-2);
- Revision of analytical parameters to include the performance standards from Section G of the ROD.
- Identifying the five stream monitoring stations (Drawing No. H-2) suggested by the EPA and the recognition of MDNR Basin Run sample location as a reference site for the benthic macroinvertebrate monitoring.

In response to EPA's comment No. 16, the stream monitoring schedule has been modified to include:

- One full round of monitoring samples at the mid-point of cover construction.
- Two full rounds of monitoring samples in the first year after construction. The first round of post-construction sampling will include one spring and one fall sampling round coordinated with the benthic macroinvertebrate sampling.
- One full round of monitoring samples annually for the life of the cover, or as modified by regular evaluation of the monitoring program. Annual sampling will be alternated between spring and fall to accommodate seasonal benthic macroinvertebrate monitoring.

21. Page 3-6, Section 3.1.4: Please see EPA's May 27, 1998 comment 15 on the HIA/ERP.

The Wetland Monitoring and Maintenance Plan has been modified to trigger *Phragmites* eradication activities in the drainage basin wetlands if the aerial cover exceeds three percent within the wetland.

22. Page 3-7, Section 3.1.5: The ROD specifies that perimeter landfill gas will be collected on a quarterly basis and analyzed for methane and volatile organic compounds (VOCs). Please state this explicitly in the FSAP. In addition, as stated in our March 11, 1998 comment 56, samples from the perimeter landfill gas monitoring probes should be collected at least twice a day when the geomembrane is being placed. Please include the requirements for monitoring landfill gas during construction in the FSAP or the CQAP. As previously requested, also specify that emissions from the gas collection vents will be evaluated. Such evaluation should include analysis of VOCs and determination of emissions flux. This information will be used to determine the adequacy of the passive gas collection system. (See EPA's letter dated June 25, 1996.)

Response: Sections 3.1.5 and 3.2 and Appendix D have been revised to address scheduling requirements and gas monitoring analytes. Additionally, requirements to measure and evaluate emissions and flux from gas vents are included in these sections.

23. Pages 3-7 to 3-9, Section 3.2: Please include a monitoring schedule for perimeter landfill gas and gas vent emissions (a minimum of one round of samples and flux measurements at each of the gas vents is recommended).

Response: The monitoring schedule has been provided in Section 3.2.

24. Page 3-8, Stormwater Discharge Sampling: Please see EPA's May 27, 1998 comment 17 on the HIA/ERP.

Response: The appropriate sections of Appendix H have been revised to include discussion the analytical parameters for baseline stormwater discharge monitoring.

25. Page 4-1, Section 4: Section 4 only addresses surface water and sediment sampling. Please include landfill gas sampling requirements (probes and vents). A detailed description of field procedures for monitoring activities is not included in Appendix A as indicated in the first paragraph on page 4-1. Please include.

Response: The reference to Appendix A has been changed to Appendix D, which is the location of the gas sampling description.

26. Page 5-1, Section 5: The FSAP states, "Appendix D provides details regarding the analytical method that will be used for quantification of ethane, ethene, carbon dioxide and methane." The ROD requires quarterly analysis of VOCs and methane in perimeter landfill gas monitoring probes. Evaluation of gas vent emissions should include VOC analysis and emissions flux. Please revise.

Response: Section 5 has been changed to require VOCs and methane analysis.

Response: Appendix D has been amended to describe proposed sampling protocols in more detail. Laboratory samples will be collected in Summa canisters, and Tedlar bags will be used for field analysis. Method TO-14 has been specified for analysis of VOCs in landfill gas. Procedures for measuring emissions flux at gas vent outlets have been included in this appendix.

28. Page 4-3 to 4-4, Sections 4.4. and 4.5: Please define "contaminated soil" and "uncontaminated" materials. As previously stated, acceptance criteria for borrow materials should not be limited to site-related "Contaminants of Concern." Delete that phrase from the CQAP. See comment 8, above, regarding parameters to be considered in evaluating whether borrow material is free of unacceptable levels of contaminants. The CQAP states that "materials exhibiting concentrations above actions levels...shall not be permitted on the site." Specify the "action levels." The CQAP also states that "all borrow soil sources must be certified clean and approved by the MDE and USEPA." See comment 11.

29. Appendix K: Please provide a figure showing the area to be excavated and areas where soil mercury concentrations exceed 1 mg/kg.

Response: Figure K-1 has been provided in Appendix K showing the approximate area to be excavated and the approximate area where soil mercury concentrations exceed 1 mg/kg.

ATTACHMENT 1

SPECIFIC COMMENTS

1. Final Design Drawing B3. This drawing indicates that vadose zone gas monitoring well VGM-4 will be located approximately 200 feet outside the northern site property boundary. According to the Code of Maryland Regulations 26.04.07.21(5), "the concentration of methane may not exceed the lower explosive limit for gases at the property boundary." Please locate well VGM-4 at the site property boundary.

Response: Vadose zone gas monitoring well VGM-4 has been relocated approximately 200 feet due south, just south of the northern property boundary. Drawing B3 has been revised accordingly.

2. Final Design Drawing D1. In keeping with the 1994 Maryland Standards and Specifications for Soil Erosion and Sediment Control, anti-seep collars will be installed around pipes that penetrate erosion and sediment control embankments. However, during the March 23, 1998 conference call, the U.S. Army Corps of Engineers asked if the Maryland Department of the Environment (MDE) would consider alternatives to anti-seep collars. According to the MDE Water Management Administration's Nonpoint Source Control Program, with adequate design and construction supervision, filter diaphragms should be used in-place of anti-seep collars.

Response: We have redesigned the embankment and removed the anti-seep collar for this penetration. This has been replaced with the filter diaphragms as proposed by the MDE. Drawing Nos. D1 and D2 and Specification 02232 have been revised to include the filter diaphragm design.

3. Page 3-31. Section 3.3.1.1 Foundation Layer. This section should include the minimum thickness and slope requirements for the subbase layer. The minimum thickness requirement is two feet and the minimum slope requirement is four percent. Both of these requirements are relevant and appropriate requirements. The final design should specifically state that both of these conditions would be met in the design and construction of the cap.

This section should also specifically explain how the remedial action contractor would execute and confirm that these requirements have been met. According to Geraghty and Miller's response to agency comment on the Pre-Final (90%) Design Report, Geraghty and Miller stated that a minimum of two test pits per acre would be installed to determine the thickness of the existing cover soil across the landfill. If test pits will be installed, please specify the length of the test pits. Local variations in the thickness of the existing cover soil may be missed if the length of the test pits is too short. Geraghty and Miller also stated that if the average depth of existing cover soil is one foot, an additional six inches of cover soil across the landfill would be added after regrading to achieve the required two-foot subbase thickness. Please specify how the regrading process would evenly distribute the existing cover soil over the waste. Furthermore, please explain how 6 inches of additional cover soil over one foot of existing cover soil would achieve the required two-foot subbase thickness.

Response: Section 3.3.1.1 has been revised to include minimum thickness and slope requirements and a discussion of the test pit program. Please refer also to the response to Comment #3 from the USEPA.